

4. A company manufacturing radios agreed a 20 year contract with a retailer to supply its radios. In the first year of the contract, 500 radios were supplied to the retailer. In each subsequent year, the number of radios supplied to the retailer was 50 more than in the previous year.

The amount received by the company for each radio during year n of the contract was £ $\left(20 + \frac{n^2}{45}\right)$

The total cost of producing the radios during year n was modelled as £ $(1000 + 10n^2)$

- (a) Show that, according to the model, the profit made by the company in year n , £ P_n , is given by

$$P_n = \frac{10}{9}(n^3 + 900n + 7200) \quad (2)$$

- (b) Use the standard results for summations to show that the total profit made by the company in the first N years of the contract, £ T_N , is given by

$$T_N = aN(N^3 + bN^2 + cN + d)$$

where a , b , c and d are constants to be found.

(5)

At the end of the 20 years, the company found that its total profit made from this contract just exceeded £500 000.

- (c) Assess the model in light of this information.

(2)